



Introduction to ASML

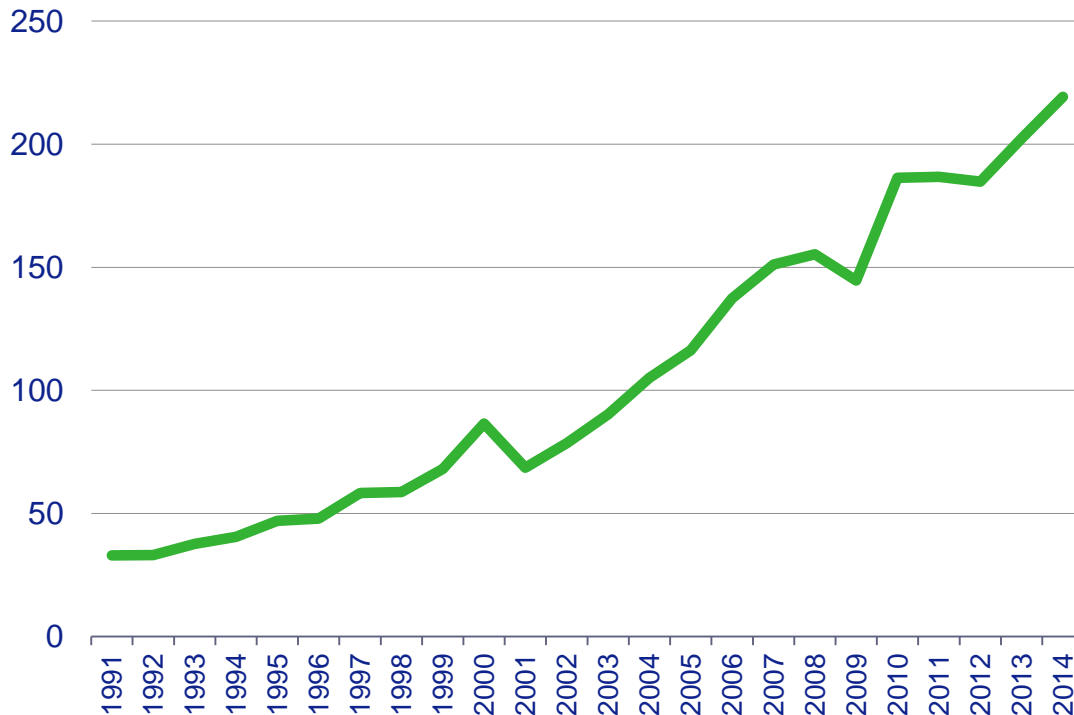
Ron Kool

SVP Corporate Strategy and Marketing

March-2015 | Veldhoven

More than 200 billion ICs are made every year

IC units, in billions



In 2014, 219 billion ICs were produced — 30 for every man, woman and child on the planet.

Global semiconductor industry sales were \$305.6 billion.

ASML makes machines for making those chips

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January 2015



Lithography is the critical tool/process step for producing chips

From shed to world leader.....

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March 2015



Introducing ASML

Headquarter in Veldhoven Netherlands

Original name ASM Lithography

Founded in 1984 as JV between the Dutch companies Advanced Semiconductor Materials International (ASMI) and Philips. 1988 ASMI withdraws, 1994 Philips decides to pull out

IPO in 1995 – Amsterdam/NASDAQ

Market capitalization ~40BEuro

Business: Lithography for semi-conductors; main product: wafer stepper

Customers: Intel, Samsung, tsmc, SK Hynix.....

Over 70 sales and service offices worldwide



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March 2015



Driving the semiconductor industry: Moore's Law

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March 2015

Gordon Moore (1965 – April 19th):

- Number of transistors per chip doubles every year.
- Prediction later was elevated to 'law'
- Later adjusted to two years, the trend has held for five decades.
- Key to maintaining the law is making smaller transistors

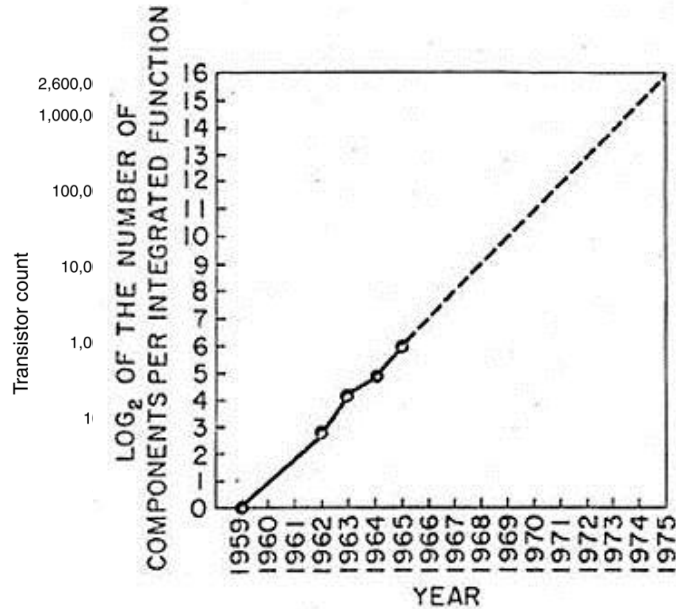
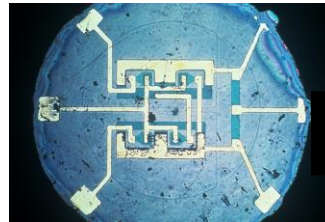
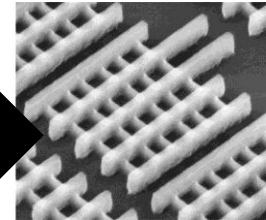


Fig. 2 Number of components per integrated function for minimum cost per component extrapolated vs time.



The first integrated circuit on silicon, on a **wafer the size of a fingernail**
(Fairchild Semiconductor, 1959)

Transistor length has shrunk by a million

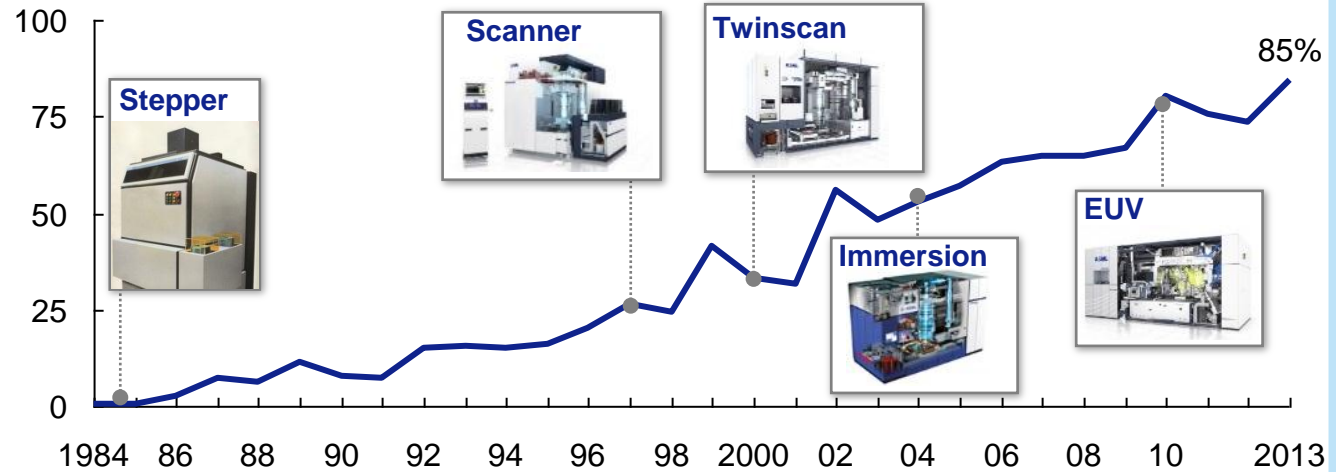


Today: **More than a billion transistors on the same area**
(Intel, 2012)

Our success is based on providing superior products that enable Moore's law

Our focused strategy enabled us to deliver **superior products** to the market resulting in a steady **increase of our market share**

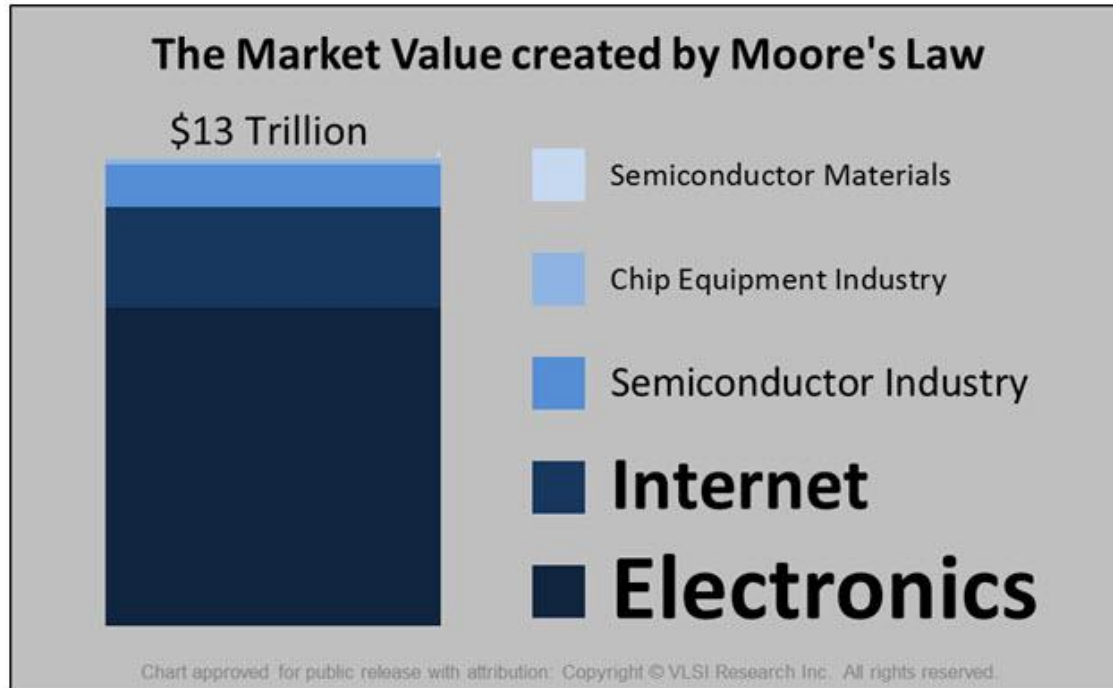
**ASML
Litho
market
share
%**



Moore's law – value creation

Market Value:

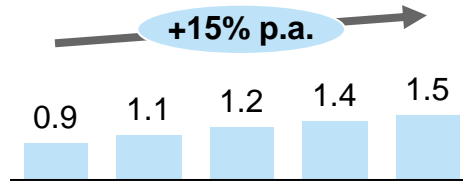
- The market value driven by Moore's Law amounted to \$13 Trillion in 2014.
- This is equal to three-quarters of the entire economy of the United States.



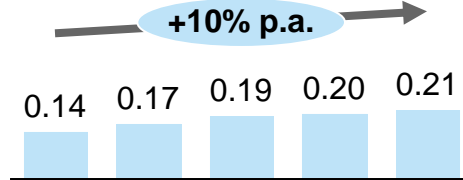
We expect Moore's law to continue due to end-user demand growth...

Further penetration of current applications through new features and cost down

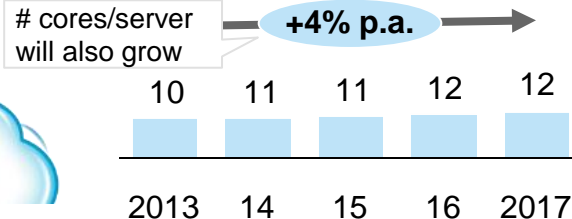
Smartphones, B units



Tablets, B units

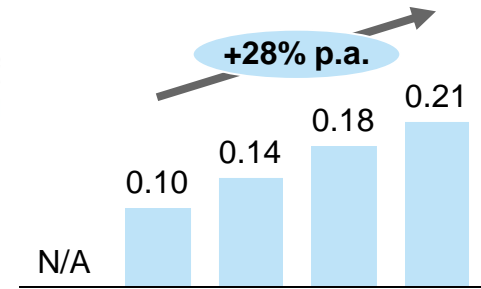


Servers, M units

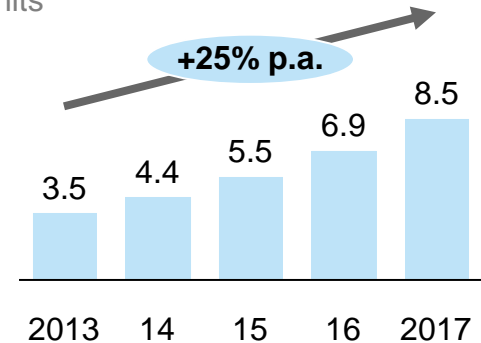


New applications are enabled by higher performance and lower cost

Wearables, B units



Connected devices, B units

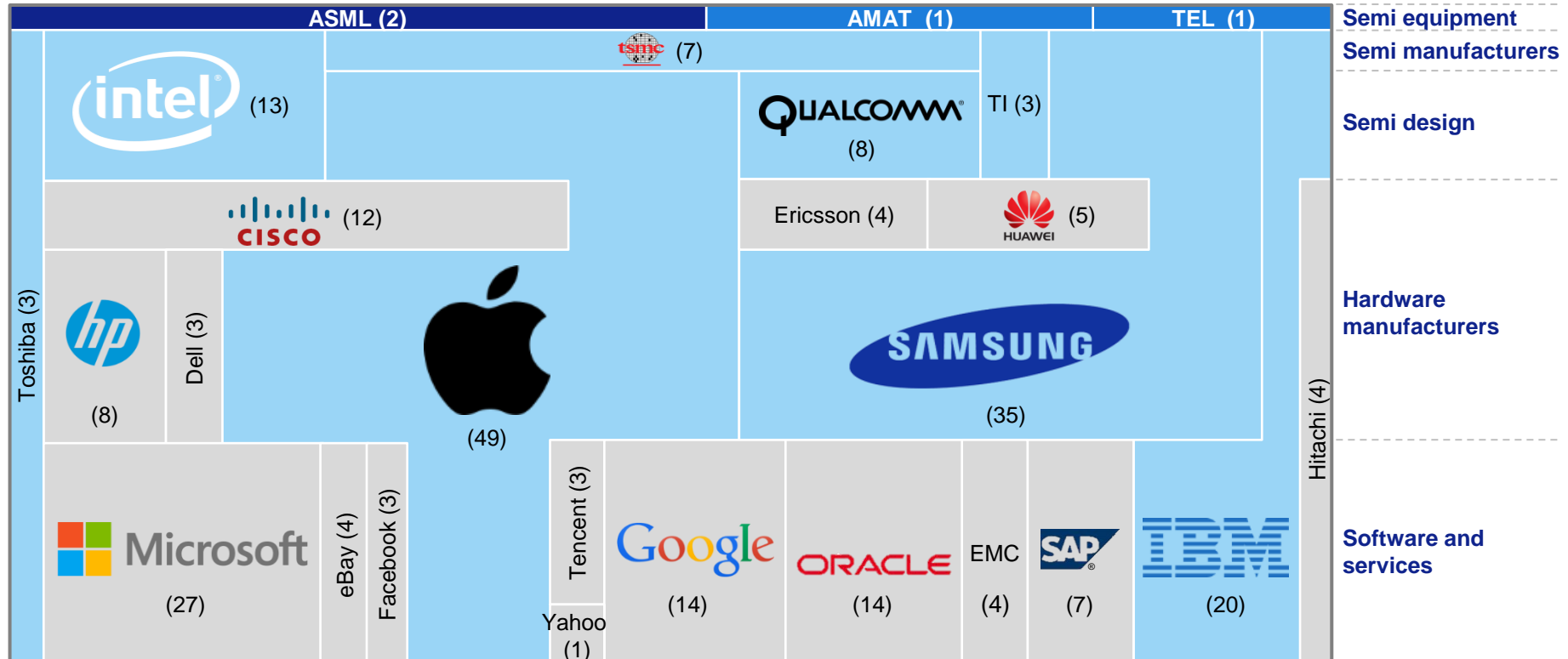


... in an ecosystem that has considerable financial means and strong incentives to drive innovation ...

ASML Semi
Peers Other

ASML
Company secret

Top technology companies in our ecosystem (EBIT 2013, B\$)



Total EBIT 2013 = ~250 B\$

Keeping up with Moore's Law

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Resolution:
1200 nanometers

Overlay:
300 nanometers

40 wafers per hour
(100mm wafers)



PAS 2000

ASML's first stepper, 1984

Resolution:
19 nanometers after
double patterning

Overlay:
As little as 1 nanometer

250 wafers per hour
(300 mm wafers)



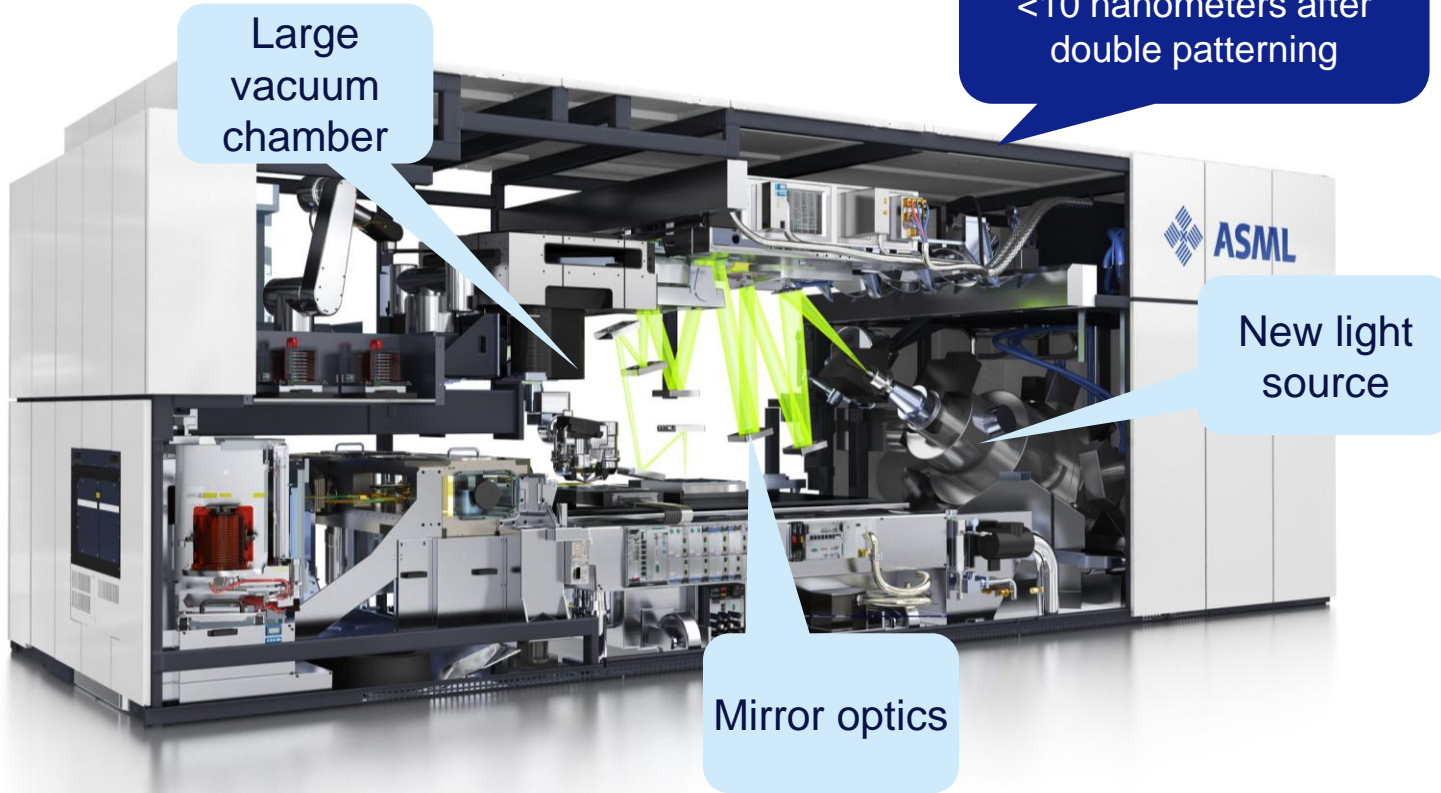
TWINSCAN NXT:1970Ci

The most advanced immersion scanner, 2013

The next step: EUV

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Innovation at ASML

① Innovation in existing product markets ☒

- Product/process innovation
- Eco-system innovation
- Business model innovation

② Incubation of new businesses ☒

③ External venturing ☐

How to make an Integrated Circuit



deposition



APPLIED MATERIALS®

process
diagnostics



Etch



Ion implant



APPLIED MATERIALS®

Lithography

Track (put resist on)



resist



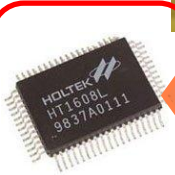
expose



mask



Track (develop)



① Open Innovation from design to manufacturing

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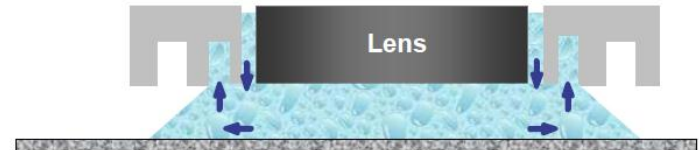
① Product/process innovation – Ship and iterate....

Introduction of immersion technology

The industry moved immersion from initial feasibility studies into production in less than four years.

Early immersion versions of ASML TWINSCAN systems gave chipmakers the opportunity to test and develop immersion technology in preparation for volume-manufacturing.

- **October 2003: Redirection from 157nm to immersion (193nm based)**
- August of 2004 ASML ships a 1st version to Albany NanoTech at the University of Albany – SUNY (State University of New York). At that time more than 16 chipmakers had already used the machine to run 10,000 test wafers.
- End 2004 - ASML ships the 2nd version of its immersion tool, the TWINSCAN XT:1250i, to TSMC, IMEC and Applied Materials, Inc.
- In 2005, introduction of a 3rd version - convertible scanner for dry or wet lithography, the TWINSCAN XT:1400. This tool gave customers the flexibility to include immersion in their technology road maps while protecting their investments in dry 193-nm technology.
- **In 2006 ASML shipped the 4th generation of its immersion exposure tool, the ASML TWINSCAN XT:1700i, included new lens technology (catadioptric), used in High Volume Manufacturing**
- In 2006, ASML announces the XT:1900i, NA of 1.35.



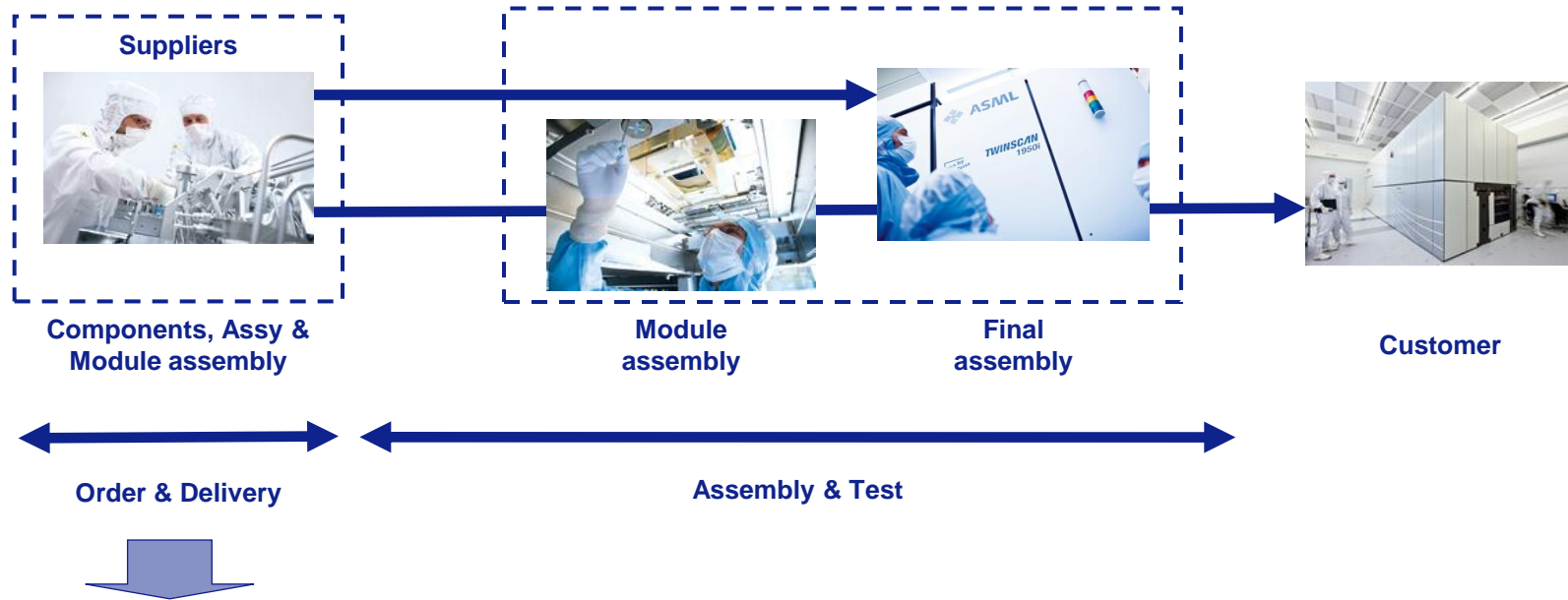
① Product/process innovation - virtual integration with suppliers

Leveraging ASML's and suppliers' individual competencies

- To optimize performance, flexibility, and risk exposure
- Through seamless, open, and trusted collaboration,
- Ultimately working as if it were one enterprise



① Open innovation in our operating model

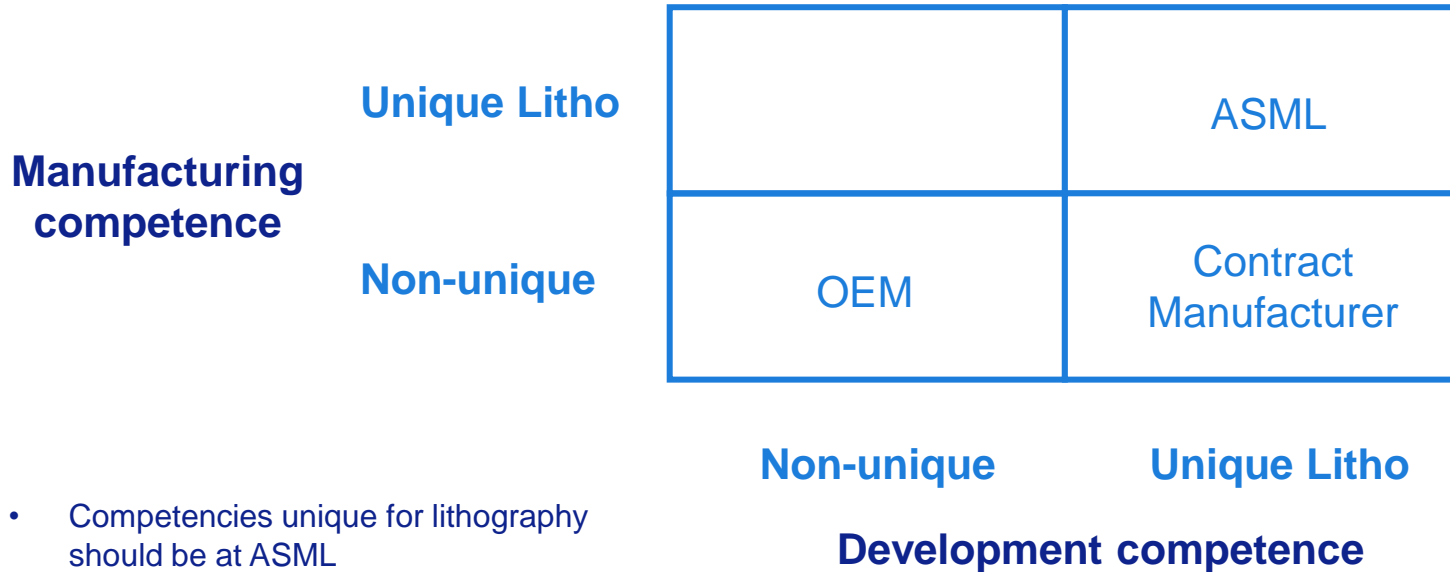


~ 600 Suppliers, of which 40 partners represent 80% of purchasing value

~ 2.000 buys (modules & parts) in one platform,
where the number of parts in a platform is larger than 150.000

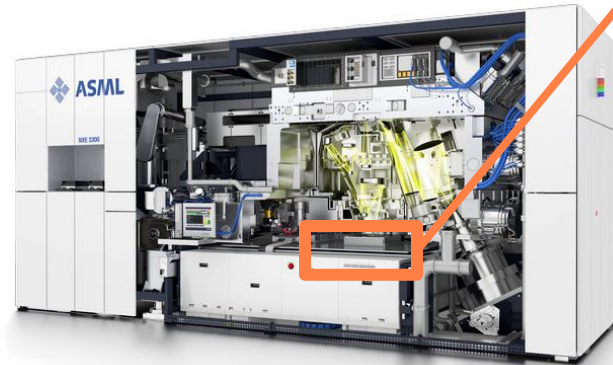
>85% of system costs from supply base

Making optimal use of open innovation: Deciding on what to “in- and outsource”

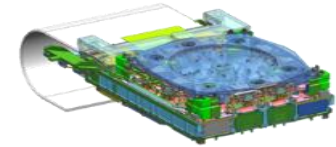


- Competencies unique for lithography should be at ASML
- Competencies non-unique for lithography should be outside ASML

Business Models differ per technology and supplier profile



Stages



Supplier : ASML
Location : Netherlands
Business Model : Make

Manufacturing of the WS short-stroke module is done internal @ ASML Veldhoven

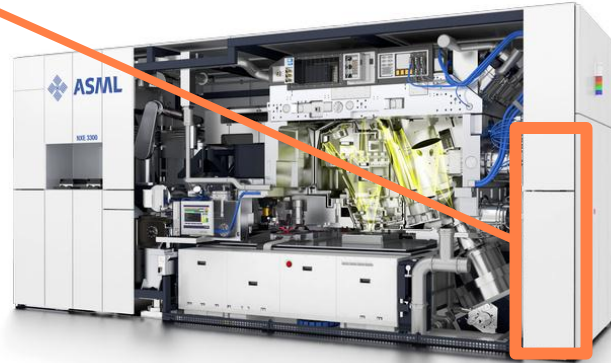
Business Models differ per technology and supplier profile

Power Electronics



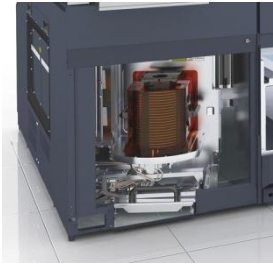
Supplier : Prodrive
Location : Netherlands
Business Model : OEM

Prodrive both designs and manufactures power electronics cabinets



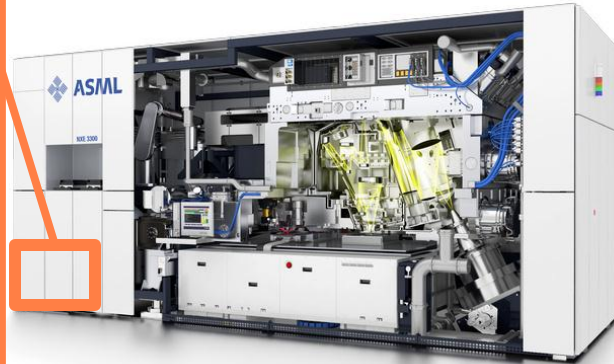
Business Models differ per technology and supplier profile

Handler



Supplier : VDL-ETG
Location : Netherlands
Business Model : TCO responsibility

VDL-ETG manufactures wafer handler and has design and sustaining responsibility to secure TCO roadmap



Customer Co-invest program

EUR 1.38 billion of research and development projects from 2013 through 2017

- For the high investments needed, ASML created partnerships with their customers to support the development of new technologies.
- The Customer Co-Investment Program (CCIP) was initiated in July 2012
 - To accelerate the development of EUV technology
 - And the development of 450mm technology
- The Participating Customers collectively funded EUR 1.38 billion of research and development projects from 2013 through 2017.
- Risk sharing with largest customers while the results of ASML's development programs available to every semiconductor manufacturer with no restrictions.
- In addition, the participating customers have invested in ordinary shares equal, in aggregate, to 23 percent of ASML's issued share capital (with restricted voting and trading rights)

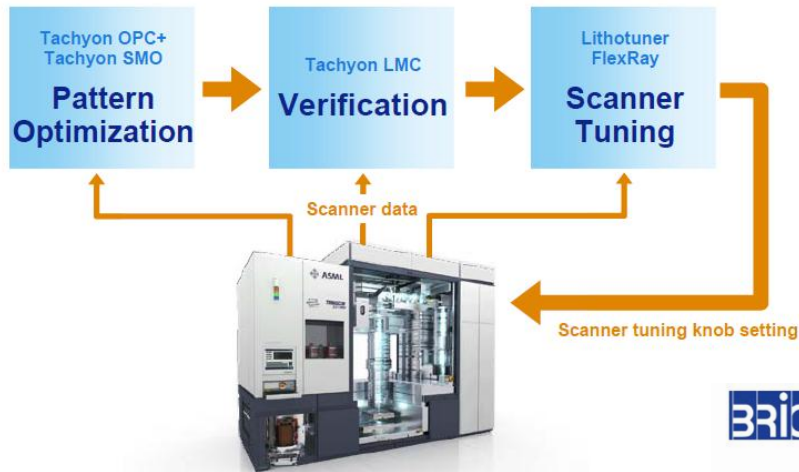
Samsung Joins ASML's Customer Co-Investment Program for Innovation, Completing the Program

VELDHOFEN, the Netherlands, August 27, 2012 - ASML Holding NV announces today that Samsung Electronics has joined its Customer Co-Investment Program for Innovation and has committed to contribute EUR 276 million to ASML's research and development of next generation lithography technologies over five years. This completes the program, as the target for aggregate R&D funding commitments of EUR 1.38 billion has now been met. Samsung has also committed to invest EUR 503 million in a 3 percent ASML equity stake under the same general terms as the other program participants.

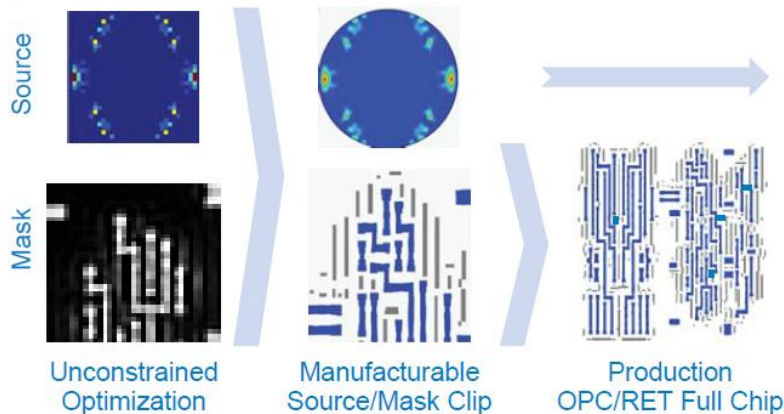
Under the Co-Investment Program, which was announced on July 9, 2012, ASML will accelerate the development of key lithography technologies needed to extend Moore's Law, notably Extreme Ultraviolet (EUV) lithography. These technologies will benefit the entire industry, and will enable smarter, more powerful, more energy-efficient and cheaper electronic devices for consumers.

Connecting (manufacturing) to the design process of the customer

ASML holistic lithography application flow to optimize the process window



Tachyon SMO Flow - Optimized, manufacturable solutions



BRION

LithoTuner™

LithoTuner™ is a solution that matches each scanner to every reticle.



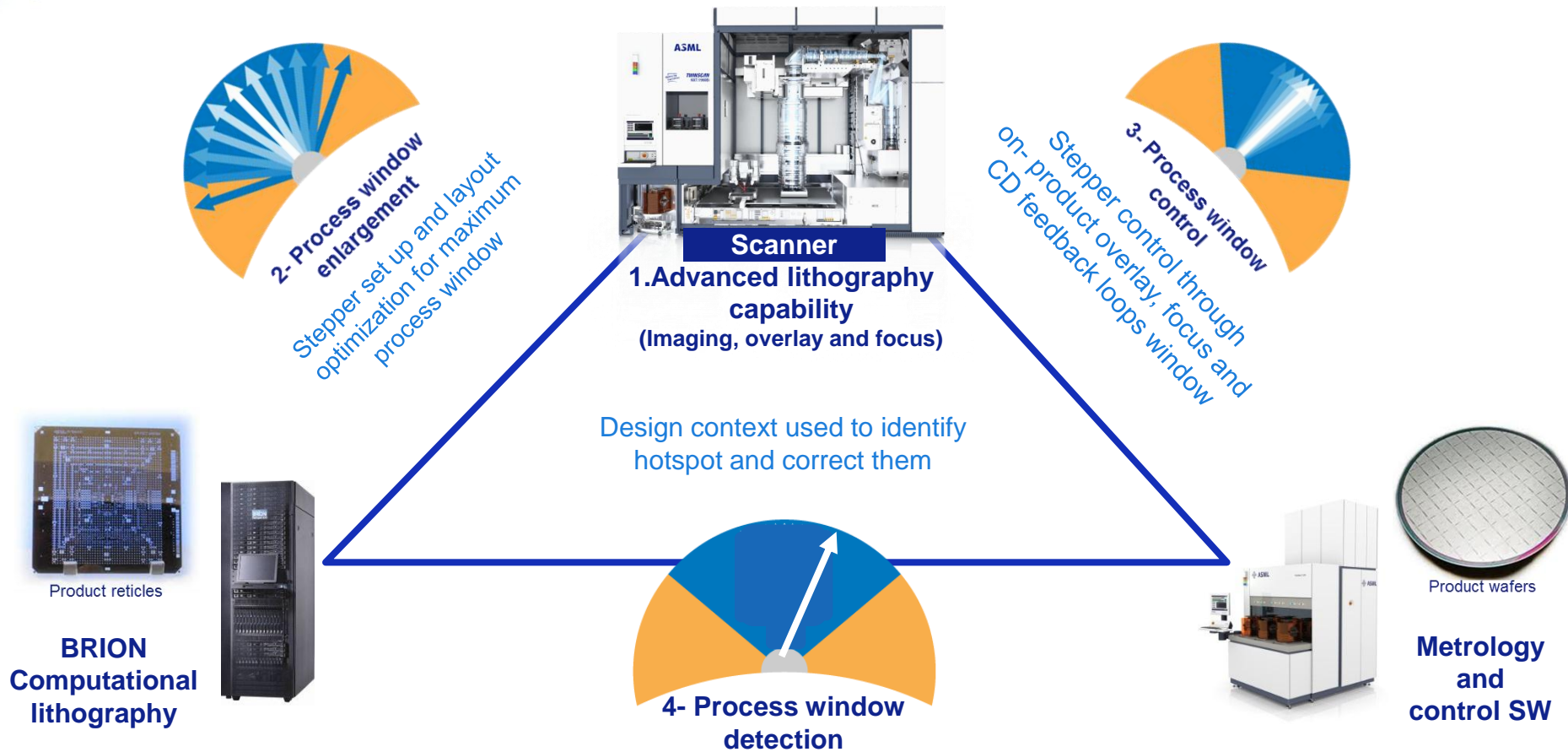
② Incubation of new business: ASML holistic lithography

ASML

Confidential

Slide 26

30 January 2014



The image features the ASML logo in a bold, dark blue, sans-serif font. The logo is positioned on the left side of the frame. The background is a light blue gradient with abstract, flowing white lines that create a sense of movement and depth, resembling stylized waves or a modern architectural design.

ASML